



### **ABSTRACT**

A well logging tool apparatus is disclosed for conducting measurements in a borehole environment surrounding a borehole that traverses a subsurface formation. The apparatus includes an elongated conductive mandrel having a longitudinal axis, an antenna array positioned about the mandrel and including a transmitter for transmitting electromagnetic energy into the formation, and a sleeve positioned about the antenna array. The apparatus further includes a first set of electrodes and a second set of electrodes. Each electrode has an outer end that is exposed on the outer surface of the sleeve for conductive contact with an adjacent conductive borehole environment. Further, the first and second sets of electrodes are spaced longitudinally apart such that the transmitter is positioned longitudinally therebetween. Electrodes of the first and second sets are conductively interconnected with the mandrel such that when the well logging apparatus is operated in a borehole environment having borehole currents therein, one or more current path loops are provided for shorting borehole currents.